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ELIMINATING BATS FROM BUILDINGS^{1/}

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Contents

	Page		Page
Introduction	1	Control	3
Description of the animals	1	Bat-proofing buildings	3
Habits	2	Repellents	4
Economic status	2	Destroying bats	4

INTRODUCTION

Bats usually become obnoxious when they take up their abode in buildings occupied by man. Requests for information on how to get rid of bat roosts have been received from all parts of the country, but particularly from the eastern tier of States from New York to North Carolina. California and Wisconsin also have been well represented, but relatively few complaints have come from the prairie and mountain States of the West.

DESCRIPTION OF THE ANIMALS

Bats are the only mammals equipped to fly. They inhabit almost all parts of the world, and more than 260 species and subspecies have been described from North America alone. The bats of the United States are relatively small, the body measuring 3 to 6 inches, and the wing expanse 10 to 18 inches. The wings consist of a thin, papery membrane connecting the greatly elongated forearm and fingers with the hind limbs, tail, and body. With this specialized equipment bats have developed a remarkable power of quick, erratic, and sustained flight that enables them to capture with the greatest ease the many forms of night-flying insects upon which they chiefly feed. Most of the common forms of bats are of some shade of brown, although slate, gray, yellow, black, and white are conspicuous in some species. Unlike most nocturnal animals, bats have very small eyes, but nevertheless even on the darkest nights are able to fly with uncanny accuracy and rapidity through dense tree growth.

^{1/} This leaflet is a revision (without illustrations) of United States Department of Agriculture Leaflet No. 109, issued in September 1935.

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HABITS

Some bats migrate freely and make their seasonal abode in the locality of the most attractive food supply. Others apparently inhabit the same roost the year round, hibernating there during the colder months. They have been found hibernating in temperatures of 25° F. below zero and have been reported as active during midwinter in many northern States as a result of incomplete or arrested hibernation in heated houses. While resting or in hibernation they normally hang head downward, suspended by the curved rigid claws of the hind feet.

Bats provide no nest of any kind. The 1 or 2 young (rarely more) cling to the mother until old enough to shift for themselves.

Bats are not preyed upon to any serious extent by natural enemies. Hawks and owls have been observed to catch them as they emerge from their roosts. In season, predatory animals sometimes wait patiently beneath bat roosts for the young to lose their hold upon their mothers and drop to the ground. Snakes also feed on them occasionally, and there is a record of a black snake established in the attic of a bat-infested house, where it apparently had fed for an extended period on roosting bats taken from between the walls.

Some species of bats are of solitary habits, while others go to the social extreme of congregating in colonies numbering millions of individuals. The bats that chiefly concern the householder by choosing available spaces in occupied buildings for their roosting sites usually gather in small colonies of a few dozen to a few hundred individuals. Bats ordinarily roost in an unused space in the upper part of the house, access to which is gained through small cracks or other openings. Records in the Fish and Wildlife Service indicate that the roosting places most frequently selected are, in the order named: In attics, between roofs and ceilings, in cornices or other crevices around the roof, in walls, in chimneys, behind shutters, around drain pipes, and behind rafters and sheathing in open barns. Bats are able to squeeze through surprisingly narrow slits or cracks — the smaller species requiring an opening no wider than three-eighths of an inch. Such openings are frequently found in old frame structures where boards have shrunk or have become warped or nails have loosened. Another common means of ingress into buildings is through openings under the overhang of the roof made by overlapping sheathing or drop siding.

ECONOMIC STATUS

Popular objections to the presence of bats might be lessened to some extent if it were more generally appreciated that these animals are not only harmless but useful as well. Their food consists entirely of insects, which are taken on the wing, and the majority of these are economically injurious. Part of the food of some species consists of mosquitoes; bats have been credited also with materially assisting in the control of codling moths and other horticultural insect pests.

The droppings of bats, known in commerce as guano, are rich in nitrogen and phosphoric acid and have a relatively high value, but there is now little commercial demand for the product. The guano in some of the larger bat caves of the Southern States, however, has yielded to their owners an increase of several thousand dollars. The usefulness of bats through their activities as insect destroyers and the value of their guano have led to several attempts, largely unsuccessful, to encourage the colonization of some species (especially the Mexican free-tailed bat, *Tadarida mexicana*) by building large, artificial roosts for them in areas in which malarial mosquitoes are prevalent.

The objection to the presence of bats is partly due to the aversion that many people have to them, similar to that they have to rats, spiders, and snakes; but complaints are usually based on the highly objectionable odor that is always associated with an established bat roost. The characteristic pungent and penetrating odor comes from the droppings and urine. Another less important objection arises from the scratchy, scrambling noises made by the bats as they make their way through double walls in crawling from the entrance holes to the final roosting spots. As this sleep-dispelling noise occurs just at dawn, objection is especially justifiable if the roosting place adjoins a bedroom. In general, the elimination of bat roosts from dwellings is necessary.

CONTROL

As bats individually are almost wholly beneficial, and at a distance are in no way objectionable, they should not be destroyed except as a last resort. It is only the bat roosts that have been established in occupied buildings that should be eliminated. This can usually be accomplished in either of two ways: (1) Excluding the bats by closing the openings through which they gain entrance; and (2) evicting them by treating their roost with a chemical substance to which they object. Occasionally in large old buildings not only will shutting out the bats be found impracticable, but the location of the roost will prevent the successful use of a repellent. In such cases fumigation with a poison gas may be necessary.

BAT-PROOFING BUILDINGS

The most satisfactory and the only permanent way of obtaining freedom from the bat-roost nuisance, however, is to shut the bats out. This may be called "bat-proofing" the building. Frequently there are only a few small entrances to the bat roost, and in such cases bat-proofing is relatively simple. It is necessary only to close the openings with strips of metal or wood or seal them by plugging the smaller cracks with rags or other soft material.

In cases where clapboard siding provides numerous openings, as under the overhang, or in very old large frame houses where warping, shrinking, and decay have left many suitable entrances, a simple and inexpensive means of shutting out the bats is found in the use of oakum. This is a tarred-hemp fiber used for calking ships, and it packs easily and firmly into any small crack. The tar binds the fiber so that it is not easily dislodged and, serving also as a repellent to the bats, it lessens the probability of their attempting to squeeze through it. A tire tool is convenient for packing the oakum into the openings. Equipped with a good ladder and a few pounds of oakum, one can in a few hours effectively seal against bats all the small openings in almost any house.

In closing the entrances used by bats it is necessary that 1 or 2 be left open until after nightfall so as to allow egress of the bats, and thus shut them out and not in. Ordinarily during midsummer all the bats will have left the roost within 15 minutes from the time the first one starts, but after their accustomed routine has been thus upset, several hours may elapse before the last bat finds its way out. Usually the best procedure is to close all but 1 or 2 of the principal openings during the day, then wait for 2 or 3 days until the bats have learned to use the only entrances left them, and then close these several hours after dark. If any openings have been overlooked the bats will probably find them. It will be necessary therefore to watch the house closely at dusk for a few days in order to complete the bat-proofing if any bats are seen leaving or entering.

REPELLENTS

To drive bats out of a roost by a repellent is sometimes simpler than to bat-proof the building. This is true where the bats infest double walls, spaces between roof and ceiling, or other boxed-in places easily reached from the attic but difficult of access from the outside. The most effective repellent has been found to be naphthalene flakes. This chemical is inexpensive and can be obtained from any drug store. The bats greatly dislike the gas given off by the naphthalene and will leave the roost in broad daylight within a few minutes after it has been introduced. The flakes should be thrown liberally around or into the spaces occupied by the bats. Ordinarily 2 to 5 pounds are required for the average bat roost in dwellings. The bats will not return so long as a strong naphthalene odor remains, but they may return after several weeks when the chemical has dissipated. If they do so, it will be necessary to repeat the application. Bats are difficult to dislodge from an old established roost, and the persistence of their characteristic odor is likely to attract other bats. For this reason bat-proofing, though more difficult, is a much more desirable control method than the use of the naphthalene.

DESTROYING BATS

Killing the bats by fumigation is possible, although there are serious objections to the use of a poison gas in an occupied dwelling, and this method is not recommended except as a last resort, after other means have failed. Destruction of the bats is usually undertaken when bat-proofing is impracticable because of the cost and the difficulty of reaching some of the roosting places with a repellent. This condition means that it will not be possible to reach and remove the carcasses, the decomposition of which will for a time add to the obnoxious odors associated with a bat roost. It also means that the openings through which the bats had gained entrance to their roost must remain open, and then the characteristic bat odor will long remain an invitation to other bats to reestablish the roost.

The best poison gas for use in destroying bats is hydrocyanic acid gas, which can be generated and applied by several methods. It is highly effective, but as it is also extremely poisonous to human beings, it should not be used without full knowledge of the dangers involved and of the precautions to be taken.

When spaces between walls are occupied by bats, they can often be reached from the outside by loosening boards or siding or by boring a hole with a brace and bit. Into such openings the nozzle of a dust pump may be inserted and calcium cyanide dust blown into the cavity. Calcium cyanide rapidly generates hydrocyanic acid gas by combining with the moisture in the air. The quantity of dust needed will depend on the size of the cavity to be filled, but in the average residence a pound or two of dust will usually be ample for treating small enclosed spaces between double walls and between a ceiling and the floor above. The dust-pump method should not be used from the inside. The house should be vacated before calcium cyanide is used and should not again be entered until it has been aired for several hours after the gassing.

In many cases the more practical treatment would be to fumigate the entire attic, or even the entire building, which would allow the gas to penetrate into all openings and insure the destruction of all animal life in the building. Farmers' Bulletin 1670, Hydrocyanic Acid Gas as a Fumigant, issued by the United States Department of Agriculture, gives full instructions for fumigating buildings for destroying household insects, and the procedure recommended is also applicable in the destruction of bats. In general, when fumigation for destroying bats is found necessary, the work should be entrusted to an experienced operator.